

Sample Test 1
Mathematics A1
 October, 2009

1. Given the complex numbers $z_1 = -\sqrt{3} + i$ and $z_2 = \sqrt{2} - i\sqrt{2}$. Find $\frac{i^{2008} \cdot (z_1)^6}{z_2}$ in algebraic form. (2 points)

2. Find all complex solutions of the equation: $z^4 + 4z^2 + 16 = 0$. Give your answers in algebraic form. (2 points)

3. Find the distance of the planes S1: $2x + y - 2z = 20$ and S2: $2x + y - 2z = 11$. (2 points)

4. Given the points : $A(1;0;-1)$, $B(3,-1,1)$, $C(4,1,0)$.
 a.) find the equation of their plane;
 b.) find the area of the triangle ABC. (3 points)

5. Find the limits of the following sequences:
 a.) $\lim_{n \rightarrow \infty} (\sqrt{n^2 + 24n} - \sqrt{n^2 + 1})$, b.) $\lim_{n \rightarrow \infty} \left(\frac{n}{n-4} \right)^{2n-1}$. (2 points)

6. Let $f(x) = 2 \arccos(2x - 4)$. Find the domain and range of f . Give the domain and range of the inverse function. Give the inverse function. (3 points)

7. Find the following limits if they exist:
 a.) $\lim_{x \rightarrow \infty} \frac{(3-x)\arctan(x^2)}{(\sqrt{x}-2)^2}$, b.) $\lim_{x \rightarrow \frac{\pi}{2}^+} \frac{2x}{\tan 2x}$, c.) $\lim_{x \rightarrow 0} \frac{2x}{\tan 2x}$ (3 points)

8. Given the function $f(x) = x^3 - 3x^2 + 4$
 a.) Find the equation of the line tangent to the curve at $x_0 = 1$.
 b.) Find the points at which the function $f(x)$ in ex. 8. has a tangent line with slope 9. Write the equation of these lines. (3 points)

Total: 20 points